Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
REVIEW OF THE EMERGENCY ALERT SYSTEM	)	EB Docket No. 04-296
	)	

To: The Commission

COMMENTS OF RURAL CELLULAR ASSOCIATION

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SUMMARY

Wireless carriers operate under legal and technological constraints unlike those of the news and entertainment providers that now bear public alert and warning obligations within the Emergency Alert System ("EAS"). Rural Cellular Association ("RCA") proposes ways in which wireless carriers can operate within those constraints and provide EAS messaging.

RCA cautions that the Communications Act of 1934, as amended ("Act"), does not explicitly authorize the Commission to mandate that cellular carriers transmit EAS messages over their networks. And the exercise of the Commission's ancillary jurisdiction under Title I of the Act is limited to circumstances where regulations are reasonably ancillary to its effective performance of its statutorily mandated responsibilities. A Commission requirement that a wireless carrier transmit EAS messages would constitute regulation of the nature and the content of the transmissions that may be deemed contrary to §§ 3 and 332 of the Act.

A cellular service provider, or any Commercial Mobile Radio Service ("CMRS") provider, is subject to regulation as a "telecommunications carrier" under the Act. The *sine qua non* of telecommunications carrier status is the offering to transmit information of the user's choosing, between or among points specified by the user, for a fee or for profit. If required to provide a broadcast-based EAS service, a wireless carrier would transmit information chosen by the President or by emergency operations managers, between a point and unspecified multiple points, and do so for free. Thus, if CMRS providers are obliged to transmit the EAS messages of non-network users for free, they will no longer operate as telecommunications carriers. To regulate carriers in a manner antithetical to their statutory classification does not appear to be reasonably ancillary to the effective performance of the Commission's statutory responsibilities.

Unless Congress imposes EAS obligations on the wireless industry, participation by

wireless carriers in the current broadcast-based EAS should be voluntary. RCA suggests that the Commission establish a system in which wireless carriers can decide whether they wish to offer a service which permits subscribers to receive carrier-transmitted public alerts and warnings.

RCA recommends the adoption of an audio-based wireless EAS that utilizes the Specific Area Message Encoding ("SAME") technology employed by National Oceanic and Atmospheric Administration ("NOAA") Weather Radios. During an emergency, the NOAA's National Weather Service ("NWS") sends out a special tone that activates any NOAA Weather Radio, a specialized consumer electronic device, in the listening area. SAME technology can be used to program cellular phones to monitor the NWS' radio network and receive its broadcast warnings.

As compared to limited-length text-based EAS messages, unlimited-length audio-based EAS messages from wireless phones integrated with receivers that can monitor NWS audio broadcast warnings could provide life saving information to all recipients who are in the path of danger. Such receivers could turn on automatically during an emergency broadcast and could be programmed to receive messages of any length targeted to a small geographic area using SAME codes. SAME codes could be dynamically programmed by a wireless carrier to allow alerts to follow its customers as they move from place to place.

RCA urges the Commission not to subject small cellular operators to an unfunded mandate to provide broadcast-based EAS service. If it mandates that wireless carriers transmit EAS messages over their networks, the Commission must conform its mandate to the nature of wireless service as defined by the Act. Thus, wireless carriers must be authorized to provide EAS service to their subscribers for profit. It would be otherwise if the Commission adopts RCA's approach. No provision of the Act applies directly when wireless carriers provide their customers with cellular phones programmed to receive EAS messages broadcast by the NWS.

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COMMENTS OF RURAL CELLULAR ASSOCIATION

Rural Cellular Association ("RCA")[1], by its attorneys, respectfully submits these comments in response to the Commission's Further Notice of Proposed Rulemaking in the above-captioned proceeding seeking comment on the actions the Commission should take to help expedite the development of the Emergency Alert System ("EAS") as a fully integrated, state of the art, digitally-based public alert and warning system for the American public. *See Review of the Emergency Alert System*, 37 Communications Reg. (P&F) 47, 51-52 (2005) ("*FNPRM*"). In particular, RCA will address the steps the Commission is authorized to take to facilitate wireless provision of alert and warning.

I. Introduction

With its initial comments in this proceeding, RCA submitted a paper prepared by David Crowe, an expert on wireless industry, entitled "White Paper on Emergency Alert Systems Using Cellular Technology."[2] Mr. Crowe showed that cellular systems were not designed as a vehicle to disseminate Presidential messages or other emergency information simultaneously to all

[1] RCA is an association representing the interests of approximately 100 small and rural wireless licensees providing commercial services to subscribers throughout the nation. Its member companies provide service in more than 135 rural and small metropolitan markets where approximately 14.6 million people reside. RCA was formed in 1993 to address the distinctive issues facing wireless service providers.

[2] *See* Comments of Rural Cellular Association, EB Docket No. 04-296 (Oct. 29, 2004) ("RCA Comments"). For ease of reference, Mr. Crowe's "white paper" is attached as Attachment A.

cellular subscribers, nor are they easily modifiable to offer that capability. RCA recommended that the Commission not incorporate cellular telephones into the system for delivery of EAS messages. *See* RCA Comments, at 2.

The Commission questioned its authority to regulate a comprehensive digital public alert and warning system. *See FNPRM*, 37 Communications Reg. (P&F) at 67. RCA looked solely at the issue of whether the Commission has congressionally delegated authority to require wireless telecommunications carriers to *transmit* EAS messages. As will be discussed below, RCA finds no such authority. While it appears that the Commission cannot compel wireless carriers to broadcast EAS messages, RCA will offer its view of how the wireless industry can be part of the next-generation alert and warning system and best serve the American people.

II. Comments

A. The Commission Appears To Lack Statutory Authority To Mandate Wireless Transmission Of EAS Messages

In the *FNPRM*, the Commission pointed to §§ 1, 4(i) and (o), 303(r), and 706 of the Communications Act of 1934, as amended ("Act") as providing it with jurisdiction to regulate emergency alerts and warnings. *See id.* at 49. Not one of these provisions explicitly authorizes such regulation, much less the imposition of EAS obligations on wireless telecommunications carriers. *See id.* at 49 n. 13 (summarizing the statutory language). In the absence of explicit statutory authority, the issue becomes whether the Commission's ancillary jurisdiction under Title I of the Act empowers it to require wireless carriers to transmit emergency alerts.

The Commission's ancillary jurisdiction is limited to circumstances where: (1) its general jurisdictional grant under Title I covers the subject of the regulations and (2) the regulations are reasonably ancillary to its effective performance of its statutorily mandated responsibilities. *See American Library Ass'n v. FCC*, 406 F.3d 689, 700 (D.C. Cir. 2005). RCA readily concedes that

the radio transmissions of licensed wireless telecommunications fall within Title I's general jurisdictional grant. However, a Commission requirement that a wireless carrier transmit an EAS message would constitute government regulation of both the nature and the content of the transmission. Such regulation may not pass the second prong of the ancillary jurisdiction test considering the Supreme Court's "cautionary approach" in applying that prong of the test. *See American Library Ass'n*, 406 F.3d at 702.

A cellular service provider is subject to regulation as a "telecommunications carrier" under the Act.[3] The *sine qua non* of telecommunications carrier status is the offering to transmit "information of the user's choosing" "between or among points specified by the user" for a fee.[4] If required to provide a broadcast-based EAS service, a wireless carrier would transmit (1) information chosen by the President or by federal, state, and local emergency operations managers, (2) between a point and unspecified multiple points, and (3) do so for free. Thus, if CMRS providers are legally obliged to transmit the public alerts and warnings of non-network users for free, they will no longer operate as telecommunications carriers under the Act. To regulate telecommunications carriers in a manner that is antithetical to their statutory classification does not appear to be reasonably ancillary to the effective performance of the Commission's statutorily mandated responsibilities.

The Commission cannot treat wireless telecommunications services as "equal to

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[3] Cellular service providers are classified as Commercial Mobile Radio Service ("CMRS") providers, and the statutory definition of "telecommunications carrier" includes CMRS providers. *See, e.g., Petition of Pittencrieff Communications, Inc. for Declaratory Ruling Regarding Preemption of the Texas Public Utility Act of 1995*, 13 FCC Rcd 1735, 1737 (1997).

[4] The Act defines "telecommunications" as the "transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received." 47 U.S.C. § 153(43). The term "telecommunications service" in turn means the "offering of telecommunications for a fee directly to the public, or to such classes of user's as to be effectively available directly to the public, regardless of the facilities used." *Id.* § 153(46). Thus, under the statute, a "telecommunications carrier" is "any provider of telecommunications services." *Id.* § 153(44).

television and radio as an avenue to reach the American public quickly and efficiently." *FNPRM*, 37 Communications Reg. (P&F) at 68. The "dissemination of radio communications intended to be received by the public" constitutes "broadcasting" under the Act. 47 U.S.C. § 153(6). If the Commission's jurisdiction ancillary to the regulation of broadcasting does not give it authority to impose common carrier-like obligations on cable operators, *see FCC v. Midwest Video Corp.*, 440 U.S. 689, 700 (1979), it is doubtful that the Commission's ancillary jurisdiction empowers it to impose broadcasting-like obligations on telecommunications carriers.

The Commission may feel that the imposition of EAS broadcast obligations on wireless carriers would be in the public interest and thus within its rulemaking authority under § 303(r) of the Act. *See* 47 U.S.C. § 303(r); *FNPRM*, 37 Communications Reg. (P&F) at 49 & n.13. However, the Commission's notion of what serves the public interest does not give it jurisdiction:

> The FCC cannot act in the "public interest" if the agency does not otherwise have the authority to promulgate the regulations at issue. An action in the public interest is not necessarily taken to "carry out the provisions of the Act," nor is it necessarily authorized by the Act. The FCC must act pursuant to *delegated authority* before any "public interest" inquiry is made under § 303(r).[5]

The Commission may have been delegated congressional authority to expand the reach of EAS "to cover digital communications technologies that are increasingly being used by the American public to receive news and entertainment." *Id.* at 48. However, that authority does not reach cellular services that are not being used by the American public to receive news and entertainment. RCA respectfully suggests that the Commission obtain explicit statutory authority before stretching the reach of the EAS to capture wireless telecommunications carriers

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[5] *Motion Picture Ass'n of America, Inc. v. FCC*, 309 F.3d 796, 806 (D.C. Cir. 2002) (emphasis in original). Clearly, the *President's* war powers under 47 U.S.C. § 606 cannot provide the *Commission* with ancillary jurisdiction. *But see FNPRM*, 37 Communications Reg. (P&F) at 49 & n.13.

and their networks.[6] Importantly, the Commission needs no such authority to require that cellular phones be programmed to monitor and receive EAS messages broadcast over a governmental radio network

B. EAS Participation By Cellular Carriers Should Be Voluntary

Unless and until Congress imposes EAS obligations on the wireless telecommunications industry, participation by wireless carriers in the current broadcast-based EAS should be on a voluntary basis. RCA suggests that the Commission may establish a system in which wireless carriers can decide for themselves whether they wish to offer a service to subscribers which permits them to receive carrier-transmitted public alerts and warnings.

Once technical standards for the transmission of EAS messages over CMRS systems are adopted, the Commission should announce a date by which wireless carriers must elect whether or not to participate in the EAS. If they opt in, carriers must operate in accordance with the Commission's technical standards and the EAS protocols. To maintain their status as telecommunications carriers, participating CMRS providers must transmit EAS messages for a fee and should be permitted to advertise that they participate in the EAS. If they opt out, carriers should be required to disclose to their customers that they will not be receiving EAS alerts.

C. The Commission Should Not Require Wireless Carriers To Provide Text-Based EAS Messaging

RCA directed its initial comments largely to the disadvantages inherent of using Short Message Service ("SMS") or cell broadcast technologies to transmit text-based EAS messages to a wireless carrier's subscribers. *See* RCA Comments, at 5-10. Nevertheless, the Commission sought comment on such "approaches to wireless alert and warning." *FNPRM*, 37

[6] Unlike broadcasters, many cellular operators acquired their licenses in the FCC's spectrum auctions. Under those circumstances, a Commission rule that a cellular licensee must allow its licensed cellular system to be used by governmental agencies for the public benefit may constitute a regulatory taking that requires just compensation under the Fifth Amendment.

Communications Reg. (P&F) at 68. Accordingly, RCA will summarize below its views on such approaches.[7]

SMS text messaging has significant network capacity limitations that prevent timely delivery of emergency alert messages to all of a wireless carrier's subscribers. Wireless networks were designed to provide point-to-point (e.g., subscriber to subscriber) voice and text based communications. Although such networks can become congested when too many people attempt to make voice calls, the existing networks have been shown to be quite robust in handling large volumes of point-to-point text messages. These wireless networks were not designed to provide point-to-multipoint (e.g., government to citizens) voice or text messaging and can be quite easily congested if a text message is sent to a large number of recipients and could result in delays of many hours before all persons receive the message.

SMS technology lacks geographic-specificity that will be important so as to target messages only to those persons located in the areas under an emergency alert. For example, subscribers from Virginia roaming in California would receive messages for emergency alerts in Virginia. And roamers from California who are in Virginia would never receive the emergency alerts when in Virginia.

Both SMS and cell broadcast technologies cap the number of transmittable characters thereby cutting short emergency alert messages and preventing the transmission of instructions or other useful information in an emergency. RCA believes that any form of text messaging is not appropriate for disseminating EAS messages such as Presidential emergency messages or tsunami, tornado, and other types of local disasters. The amount of useful content that can be transmitted in a typical CDMA and GSM text message of 160 characters is not sufficient to

[7] RCA acknowledges the assistance of Arthur L. Prest of Prest & Associates in preparing this portion of its comments.

inform people as to what to do in an emergency situation. Attachment B, *infra*, compares the portion of a National Oceanic and Atmospheric Administration ("NOAA") audio test message that would be transmitted using various technologies for text messaging.

Although cell broadcast technology can provide geographic specific delivery of EAS messages and is less affected by the capacity limitations of CMRS networks, there are drawbacks to cell broadcasting as well.[8] In addition to being complex and costly, cell broadcast text messaging has never been deployed commercially in the United States on GSM or CDMA networks.[9] Beyond implementation issues, cell broadcast technology requires significant investment (in network upgrades plus the change out of all CDMA handsets) and significant ongoing involvement of the wireless carrier to ensure that EAS messages are delivered to the correct geographic area. There are also liability issues for the wireless carrier if such messages are not delivered to the correct geographic area. Finally, cell broadcasting does not sufficiently solve the message length limitations inherent in text-based messaging approaches. In fact, GSM cell broadcast messages are presently limited to only 90 characters. In addition, an incoming GSM cell broadcast EAS message is not differentiated from any other cell broadcast message (e.g., a stock market update) and is thus likely to be ignored until it is convenient to read it.

All text-based technologies lack the ability to inform people meaningfully in the event of an emergency. Such technologies are likely to lead to unintended consequences that could include loading the wireless network with subsequent voice calls. The result would be counter-productive and lead to jammed networks as occurred in Washington D.C. on September 11, 2001

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[8] Simply described, cell broadcast is a method of sending text messages to all idle mobiles in range of a cell site. Unlike SMS, it is not targeted to any group of subscribers but instead is geographically targeted and can limit distribution of an EAS message to the area coincident with the emergency. *See* RCA Comments, at 8-9.

[9] *See* Comments of CTIA – The Wireless Association™, EB Docket No. 04-296, at 9 (Oct. 24, 2004).

or in London on July 7, 2005.

D. The Commission Should Require Wireless Carriers To Accommodate Audio-Based EAS Messaging Through Handsets That Can Receive EAS Broadcasts

The Commission has the authority to mandate that cellular phones have the capability to monitor and receive EAS messages broadcast over a government network. *See supra* p. 5. RCA has recommended that the Commission exercise that authority by adopting an audio-based wireless EAS that utilizes the Specific Area Message Encoding ("SAME") technology employed by NOAA Weather Radios. *See* RCA Comments, at 12-19.

The NOAA's National Weather Service ("NWS") originates approximately 80% of all EAS alerts through its All-Hazards Network.[10] During an emergency, NWS sends out a special tone that activates any NOAA Weather Radio, a specialized consumer electronic device, in the listening area.[11] Using SAME technology, NOAA Weather Radios can be programmed to receive information specific to a certain geographic area and, if equipped with a special alarm tone feature, can sound an alert and provide immediate information.[12] RCA suggests that SAME technology can be used to program cellular phones to monitor the NWS' all hazard radio network and receive its broadcast warnings.

As compared to limited-length text-based EAS messages, unlimited-length audio-based EAS messages from wireless phones integrated with receivers that can monitor NWS audio broadcast warnings could provide life saving information to all recipients who are in the path of danger. Such receivers could turn on automatically during an emergency broadcast and could be

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[10] *See Review of the Emergency Alert System*, 19 FCC Rcd 15775, 15780 (2004) ("*NPRM*").

[11] *See id.* at 15780 n.25.

[12] *See id.*

programmed to receive messages of any length targeted to a small geographic area using SAME codes.[13] Pursuant to new wireless phone and network standards, SAME codes could be dynamically programmed by a wireless carrier to allow alerts to follow its customers as they move from place to place. In the near term, simpler versions that could be manually programmed with SAME codes (as are existing NOAA Weather Radios) could be developed and produced. It is believed that the cost to make cellular phones NWS network compatible would cost only a few dollars per phone.

RCA submits that its proposed audio-based EAS methodology offers the American public the following advantages:

1. Audio-based EAS messages can be of unlimited length. EAS messages will become essentially governmental radio broadcasts that will be received by radio receivers integrated into cellular phones.

2. Since 1994 the NWS all hazards network has been expanded from 400 to 930 stations and thus the NWS all hazards network broadcasts cover 97% of the population of the United States, Puerto Rico, Guam, and the Mariana Islands. In addition with the completion of the Public Alert™ NWS standards in 2003, new television sets, scanners, CB radios, marine radios, car radios and other consumer products have been introduced that incorporate the Public Alert™ NWS capabilities including the ability to wake and alert a deaf or hard of hearing person. The RCA proposal would continue the expansion of this technology and build on the existing enhanced capabilities and expanded network coverage.

3. EAS messages will not be transmitted through CMRS networks, thus avoiding bandwidth limitations.

4. EAS messages will be originated by the NWS, thereby relieving wireless carriers of the responsibility of disseminating emergency alerts and warnings.

5. The use of SAME technology will permit EAS messages to be transmitted to very discrete geographic areas (almost 9,000 geographic specific areas per state are possible). At the government's request, cell sites having discrete SAME codes could be constructed at critical locations, such as the Capital, the Pentagon, nuclear power plants, and airports.

[13] A SAME code is a six-digit number that is digitally broadcast at the beginning of an alert message. The six-digit code is based on the Federal Information Processing Standard and identifies a specific geographic area. SAME codes allow receivers equipped with the SAME feature to sound an alert for only certain weather conditions or within a limited geographic area (such as a county).

6. An audio-based EAS methodology is technologically and competitively neutral since it is not based on any specific digital wireless technology.

7. According to a recent Consumer Electronic Association survey, 67% of those surveyed were interested in owning a portable device having NOAA Weather Radio capability. Such consumer interest could be transferred to cellular telephones that contain an integrated NOAA Weather Radio.

8. Radio receivers are already in use in cellular phones. For example, Nokia offers an FM radio in its newest handset.

E. The Commission Should Not Subject Wireless Carriers To An Unfunded Mandate To Deploy A Wireless EAS

The Commission clearly presumes that the public safety benefits that would result from imposing new public alert and warning obligations on communications service providers far outweigh the costs and burdens of complying with the new requirements.[14] However, the Commission also has recognized that small operators may not have the financial resources to absorb the costs of complying with new EAS requirements.[15] That is the case with the rural cellular service providers that comprise RCA's membership. *See* RCA Comments, at 19. Consequently, RCA urged the Commission not to subject small cellular operators to an unfunded mandate to provide broadcast-based EAS service. *See id.* at 19-22. Jurisdictional considerations also militate against an unfunded mandate.

The Commission cannot fashion and impose a regulatory obligation on wireless carriers without reference to the provisions of the Act that directly govern telecommunications carriers. *See generally Midwest Video*, 440 U.S. at 706. If it is to mandate that wireless carriers transmit EAS messages over their networks, the Commission must conform its mandate to the nature of wireless service as defined by the Act. Accordingly, wireless carriers must be authorized to

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[14] *See FNPRM*, 37 Communications Reg. (P&F) at 52 (¶ 18), 54 (¶ 26), 58 (¶ 38), 64 (¶ 54).

[15] *See NPRM*, 19 FCC Rcd at 15792.

provide EAS service to their subscribers "for a fee," 47 U.S.C. § 153(46), or "for profit." *Id.* § 332(d)(1). It would be otherwise if the Commission adopts the approach RCA recommends. No provision of the Act applies directly when wireless carriers participate in the EAS by providing their customers with cellular phones programmed to receive EAS messages broadcast by the NWS.

RCA suggests that Congress provide the funding for the development of wireless industry network standards that would allow SAME codes to be dynamically programmed by a wireless carrier to allow alerts to follow its subscribers as they travel from place to place. Federal funding should support the development of the programmable NOAA receiver chips.

There should be no forced change-out of wireless phones. On average, customers are replacing their phones every two to three years. The Consumer Electronic Association survey suggests that subscribers will quickly migrate to cellular phones with an integrated NOAA Weather Radio.

If wireless carriers are required to deliver text-based EAS messages before an audio-based capability is developed, rural carrier costs should be funded by the federal government. As rural wireless service providers strive to add cell sites to improve service availability in mountainous and remote terrain, they cannot also pay for equipment and services necessary to meet unfunded federal mandates. Likewise, a pass-through of costs to customers is impractical because rural wireless carriers that typically provide the best wireless service in rural areas do not have large subscriber bases to absorb mandate costs.

III. Conclusion

Wireless carriers operate under legal and technological constraints unlike those of the news and entertainment providers that now bear public alert and warning obligations. RCA has

proposed ways in which wireless carriers can operate within those constraints and provide EAS messaging. It looks forward to working with the Commission and other stakeholders to achieve that end.

Respectfully submitted,

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Cellular Networking Perspectives

White Paper on Emergency Alert Systems using Cellular Technology

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David Crowe has been involved in technical aspects of cellular systems since 1984, and standardization since 1988. He was a cellular switching systems software developer from 1984 to 1992 at NovAtel, and an active participant in the TIA TR-45.2 standards subcommittee since 1988. He is now the chair of TR-45.2 and also of 3GPP2 ERA (Evolution, Requirements and Architecture). He is the editor of J-STD-036 (E911 Phase 2 network support), TIA-928 (TIA-41 support for MEID) and TIA-945 (TIA-41 support for Enhanced Security Algorithms). He was approved as a 'forensic expert in the field of wireless technology' by the Ontario (Canada) Superior Court in 2003.

David has consulted, since 1992, for many major organizations in the wireless industry, including Alcatel, AT&T Wireless, Tandem (now HP), Agilent (formerly HP), Qualcomm, CTIA, and ATIS. He is the International Roaming MIN and SID administrator for IFAST. David has written columns and articles since 1995 for a number of industry magazines, including Wireless Telecom and Wireless Review, and publishes two newsletters: Cellular Networking Perspectives and Wireless Security Perspectives.

Introduction

This report was prepared at the request of the Rural Cellular Association. It provides a technical analysis of the possibility of providing an Emergency Alert Service in the United States using available cellular phones and networks. It is based on publicly available documents, including government publications and industry standards.

References

The following documents were used in the preparation of this report.

[03.41]	TS 03.41. *Technical realization of Cell Broadcast Service (CBS) (Release 1998)*. 3GPP. 2000 Oct.
[44.012]	TS 44.012. *Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface*. 3GPP.
[BATS]	TIA/EIA-136-630. *Broadcast Teleservice Transport – Broadcast Air Interface Transport Service (BATS)*. TIA. 1999 Nov.
[C56]	C56 User Guide. Siemens. 2002.
[CEASA]	Airadigm Communications Successfully Demonstrates Nation's First Wireless Phone Emergency Alert System. CEASA. 2004 Sep.
[FCC 04-22]	FCC 04-22 (WT Docket No. 01-108). *Year 2000 Biennial Regulatory Review – Amendment of Part 22 of the Commission's Rules to Modify or Eliminate Outdated Rules Affecting the Cellular Radiotelephone Service and other Commercial Mobile Radio Services: Order on Reconsideration*. FCC. 2004 Feb 12.
[IS-637]	TIA/EIA/IS-637. *Short Message Services for Wideband Spread Spectrum Cellular Systems*. TIA. 1995 Dec.
[IS-91]	TIA/EIA/IS-91-A. *Base Station - Mobile Station Compatibility Specification for 800 MHz Cellular, Auxiliary, and Residential Services*. TIA. 1994 Oct.
[J-36]	J-STD-036-A. *Enhanced Wireless 9-1-1, Phase 2*. TIA. 2002 Jun.
[Mouly]	Mouly M, Pautet M-B. *The GSM System for Mobile Communications*. 1992.
[NDIS WG]	*Effective Disaster Warnings*. Working Group on Natural Disaster Information Systems. 2000 Nov.
[PPW, 2004]	*The Emergency Alert System (EAS): An Assessment*. Partnership for Public Warning. 2004 Feb.
[SAME]	*NWR Specific Area Message Encoding: NWR SAME*. National Weather Service. 1999 Jul 13. http://www.nws.noaa.gov/nwr/resources/same.pdf
[Sigurd]	Sigurd B et al. *Word Length, Sentence Length and Frequency – Zipf Revisited*. Studia Linguistica. 58 (1). 2004.
[TDMA Codes]	TIA/EIA-136-020-E. *SOC, BSMC, and Other Code Assignments*. TIA. 2004 Jan.
[TIA-41]	TIA-41. *Wireless Radiotelecommunications Intersystem Operations*. TIA. 1997 Dec.
[TIA-637]	TIA-637-C. *Short Messaging Services*. TIA. 2004 Aug.
[TIA-917]	TIA-917. *Wireless Priority Service*. TIA. 2004 Sep.
[TSB-114]	TSB-114. *Wireless Network Communication for Emergency Message Broadcast (EMB)*. 1999 Dec.
[Utterback]	Utterback A. *Broadcast Voice Handbook*. Bonus Books. 1995. As quoted at http://ccms.ntu.edu.tw/~karchung/intro%20page%2031.htm
[Weiser]	Weiser DD. *Method of communicating emergency warnings through an existing cellular communication network, and system for communicating such warnings*. US Patent & Trademark Office. 2000 Aug.

Wireless Emergency Alerts

Wireless phones (cellular, PCS, E-SMR etc.) are now important communications tools for most Americans, for talking with friends, colleagues and in times of emergency. Most phones now provide not just voice services, but also text messaging and sometimes more exotic capabilities, such as still pictures or even video.

In times of crisis, government agencies often attempt to communicate critical information through the public media, such as television and radio broadcast stations. Some have suggested that the text messaging capabilities of wireless phones be used to complement these existing services.

The most widely used form of text messaging is "Point to Point", with the destination being a single phone. Standards for 'cell broadcast' text messaging have also been defined, where a single text message is transmitted to all mobiles in the broadcast area of a cell that are currently listening.

Background on the Current Emergency Alert System

The current Emergency Alert System was described in a paper by the National Science and Technology Council, within the Executive Office of the President of the United States [NDIS WG]:

> *The Emergency Alert System (EAS) is the national warning system designed primarily to allow the President to address the nation reliably during major national disasters. All radio and television stations (and soon all cable systems) are mandated by the Federal Communications Commission (FCC) to have EAS equipment and to issue national alerts. The stations and cable systems may choose whether they wish to transmit local warnings and they may also delay transmission for many minutes. The warnings consist of a digital packet of information and a verbal warning of up to two minutes in length [except for Presidential messages, which are unlimited in length]. The EAS interrupts normal programming or at least adds a "crawl" to the margin of the television screen.*

This report addresses a number of issues that can arise with emergency alerts:

- Alerts may be received by people outside the affected areas
- Too many alerts that do not affect them leads people to ignore warnings.
- People may be asleep at the time an alert is broadcast or in places where radio and television broadcasts are not normally received.
- Broadcasters wish to minimize interruptions to programming.
- There are liability issues when the broadcast fails (e.g. due to a power failure).

The report also defines a number of characteristics of effective emergency alert messages:

"An effective message should:

- Be brief (typically less than two minutes [for spoken messages] and preferably less than one minute)
- Present discrete ideas in a bulletized fashion
- Use nontechnical language
- Use appropriate text/graphics geared for the affected hazard community and general population
- Provide official basis for the hazardous event message (e.g., NWS Doppler Radar indicates tornado, police report of chemical accident, etc.)
- Provide most important information first, including any standardized headlines
- Describe the areas affected and time (e.g., "pathcasting" for moving events such as weather systems, volcanic debris or element dispersal, etc.)
- Provide level of uncertainty or probability of occurrence
- Provide a brief call-to-action statement for appropriate public response (e.g. safety instructions for protection of life and property, any evacuation instructions, shelter or other care facilities, etc.).
- Describe where more detailed follow-up information can be found"

Background on Cellular Service

There are a significant number of wide area public cellular, PCS and cellular-like wireless sytems currently in use in the United States:

- AMPS (analog)
- N-AMPS (narrowband analog)
- TDMA (Time Division Multiple Access, e g TIA/EIA/IS-54, TIA-136)
- CDMA (Code Division Multiple Access, e.g. TIA/EIA/IS-95, IS-2000)
- GSM (based on various ETSI and 3GPP specifications)
- UMTS/Wideband CDMA (based on various ETSI and 3GPP specifications)
- iDen (based on proprietary Motorola specifications)

Wireless phones commonly operate in two, three or more modes, with the modes defined based in differences in:

- Frequency bands (e.g. cellular 800 MHz and PCS 1900 MHz)
- Technology (e g. AMPS with TDMA, CDMA or GSM)

The choice of technology and frequency, when several choices exist, is based on an algorithm programmed into the handset or SIM/UIM ('smart card')

In a given geographical area there may be phones operating in all the different modes Furthermore, mobiles might be idle (not currently in a call), in a call, operating a data service, receiving a text message or even in a transitional state (e g in the process of transitioning from a control channel to a traffic channel)

Analog Service

Analog (AMPS) phones originally had no text messaging capabilities. Later standards provided only extremely limited text messaging capabilities. [IS-91] supports point-to-point text messages of only 15 characters, for example. Only 62 different symbols can be used in these messages: upper case letters, digits and a few punctuation characters.

Analog coverage is important for cross technology roamers (e.g. a TDMA/analog phone obtaining service from a CDMA/analog carrier or vice-versa), in rural areas where service has not been updated to digital and for hearing impaired people. The FCC has ruled that cellular carriers must support the technology until February 2008 [FCC 04-22].

Clearly, mobiles operating in analog mode for any of the above reasons would not be able to receive emergency alerts.

SMS: 'Point to Point' Short Messaging (Text Messaging)

Digital cellular phones have had the ability to receive text messages for several years and, more recently, the ability to send them. This is supported by GSM, UMTS, TDMA (TIA/EIA/IS-54/TIA-136) and CDMA (TIA/EIA/IS-95/IS-2000).

There are a number of problems with the use of SMS for emergency alert services:

- Alerts can be turned off in the phone or may be at too low a volume to be heard in a noisy environment or when the phone is in a bag.
- Capacity used for sending a short message to every mobile in a geographic area (and receiving an acknowledgement, and retrying when necessary) will be taken away from the capacity for other purposes, such as setup of voice calls (e.g. by emergency workers).
- Systems may need to be over-engineered to ensure that the capacity for emergency alert short messages is always available.
- SMS is a roaming service, not a geographical service. Consequently, without special filtering of messages based on the current location of the mobile, the use of this service for emergency alerts could lead to two different errors:

- Transmission of an emergency alert to a mobile whose home system is in the region of the emergency, but that is currently roaming elsewhere.
- Inability to transmit an emergency alert to a mobile that is roaming in the region of the emergency, but that has a home system in another region, possibly even another country.

Non-Geographical Nature of SMS

The non-geographical nature of SMS is an important limitation for delivering emergency alerts. Emergency alert organizations will likely only have relationships with wireless carriers in their geographical area, and thus will send alerts to them. Sending alerts to all subscribers would cover too large an area, so it will be necessary for the receiving system to identify the cellsite that each mobile is currently operating in and send short messages only to the mobiles in the target area. This is functionality that is not part of standard SMS which is designed to send messages no matter where mobiles are currently located

If emergency alerts enter the network through a [TIA-41] Message Center (MC) there is a further limitation. This network element queries the HLR using an SMSRequest message that only returns a routing address. This is the address of an MSC (Mobile Switching Center) not one of the many cell sites that it controls. Consequently, there would be no way to send messages to a small geographic area.

While it would be difficult to target subscribers who obtain service in the geographical area of the emergency, it would be next to impossible to contact roamers.

Roamers are cellular subscribers from other systems who are obtaining service while in a different service area. They may even subscribe to cellular service in a different country. Short messages can often be delivered to them but the short message has to first be sent to their home system. The only way to know the home systems of all roamers in the target area is to obtain a list of all mobiles currently operating in cellsites within the target area. This information is not available through the signaling systems normally used to send short messages ([TIA-41] and GSM MAP). Consequently, roamers would probably not receive emergency alerts, even if their home system was only a few miles away from the systems covering the area of the emergency.

This problem could only be solved by creating a new type of short message functionality whereby the text message was sent to a list of base stations (cellsites) which would then send individual short messages to every mobile currently active in the coverage area of the base station. This functionality can be more efficiently provided by cell broadcast, which is described below.

Cell Broadcast

Cell broadcast is a method of sending one text messages to all idle mobiles in a cellsite. It has several advantages for an application like emergency alerts as noted in US Patent #6,112,075 [Weiser]. Some of these advantages are:

- It is efficient because one message can be received by many mobiles.
- It is geographically targeted because alerts can be sent only to cellsites that intersect the area of the emergency.
- It can reach roamers as easily as home subscribers.
- It can reach mobiles that are not eligible for other types of services (such as voice calls) for a variety of reasons, such as lack of a valid subscription, roaming restrictions.

There are also a number of problems with cell broadcast for an emergency alert application:

- Cell broadcast messages are not acknowledged so it is not possible to know which mobiles in the cellsite coverage area received each message.
- Mobiles that are currently in a call will not receive cell broadcast messages unless they are sent on every active traffic channel as well as on the cell broadcast common channel
- Mobiles operating in a mode (such as analog) that does not support cell broadcast will not receive these messages.
- Mobiles that are turned off will not receive cell broadcasts.
- The size of a message is quite limited.
- The presentation of cell broadcasts by the phone is not specified, consequently:
  - Broadcasts may not be distinguished from point-to-point short messages.
  - Information on the priority of the message will not necessarily be displayed.

    - Messages may be presented in order received instead of in order of priority.
    - Silencing the short message alert may result in no audible alert for cell broadcast messages as well.
- Each type of broadcast is identified by a numerical identity. These are not currently standardized for emergency alerts. This coordination will be needed so that mobiles phones can process emergency alerts specially.
- The quantum of cell broadcast is the coverage area of a cell. This can be quite large in rural areas and bears little resemblance to political boundaries.
- The quantum of emergency alerts is based on the National Weather Service [SAME] system, which uses counties, parishes, cities or marine areas (or portions of).
- Cells that are not entirely within the emergency area will result in the broadcast of emergency alerts to some mobiles outside the emergency area.
- There is currently little incentive to implement cell broadcast because there is no way for carriers to charge for information carried in (non-emergency) cell broadcasts. This is because messages are received by all mobiles and acknowledge by none. Consequently there is little incentive for carriers to invest in the network equipment and software to support this technology (unlike point-to-point SMS that is sent to an individual mobile, is acknowledged, and therefore is subject to billing)
- Mobiles must be designed to ignore some categories of cell broadcast information. If this is implemented by an 'inclusion list' (i.e. list of categories to display) rather than an 'exclusion list' (list of categories to ignore) then emergency alert broadcasts will not be displayed unless every mobile's inclusion list is modified.
- Mobiles might not be programmed to delete emergency alerts that are no longer valid because they have expired or the mobile has moved outside the emergency area.

External Interfaces and Network Devices

The emergency alert provider has to have an interface to all public wireless systems in its coverage area that support cell broadcast. Unfortunately interfaces from external devices to wireless networks are not standardized. GSM's TS 03.41 states, for example, that "No mandatory protocol between the CBC [cell broadcast center] and the BSC [base station controller] is specified by GSM, this is a matter of agreement between CBC and PLMN [Public Land Mobile Network] operators". A TIA document, TSB114, similarly provides a description of information elements, without providing an implementable protocol (and TSBs, according to the TIA, cannot contain normative requirements, and thus are of less significance than an actual standard).

This lack of an external protocol could result in a proliferation of proprietary interfaces. Even where interfaces have been defined for cell broadcast, they are unlikely to have the special data elements to support the requirements identified below.

The requirements for this type of interface and the processes that it initiates include:

- Verification of the identity of the sender, e.g. through an authentication algorithm or through the use of direct physical links.
- Protecting messages on the link from unauthorized modification (e.g. by use of a physically secure link or message encryption).
- Specifying the geographical area for the alert. This will involve standardizing the type of shape (e.g. polygon) that can be provided to circumscribe this area, the limits on the complexity of this shape (e.g. maximum number of sides) and whether only a single area can be provided, or multiple disjunct areas.
- Validating the area of the alert against the authorized operational area of the emergency services provider.
- Mapping the validated alert area onto the coverage area of cell sites by the wireless carrier.
- Maintenance of accurate records of cellsite coverage in the network element receiving As [CEASA] points out, this is proprietary information. Some carriers may require this database to be within their control to prevent this information leaking out to competitors.
- The mapping between the validated alert area and the cell coverage areas must be done accurately to minimize the distribution of emergency alerts outside the zone of the emergency. Some leakage is unavoidable as cell coverage areas will not often match the area of the emergency exactly.

Cell broadcast requires a special network element known as the Cell Broadcast Center (CBC) in GSM. This is specifically outside the wireless carrier network, as GSM TS 03.41 states: "the CBC (and any originating point for cell broadcast short messages) is regarded as a node outside the PLMN [public land mobile network, i.e. wireless carrier network]".

Most of the requirements for the interface that are described above must be enforced by the carrier as they require precise knowledge of cell coverage areas. This will require a new network element within the carrier's network, one that is not described by any standards. To the external CBC it will emulate a Base Station Controller, and to the Base Station Controller will emulate a CBC. This device will also have to have the latest radio coverage information for every cell so that it can map a request from a CBC containing an emergency alert onto a list of cells, and can verify that the request is legitimate (e.g. is not directed to any cells that are completely outside the region of authority of the requestor). These new network elements will have no purpose other than validating and disseminating emergency alerts.

Mobile Handling of Emergency Alerts

There are very few requirements for the handling of cell broadcasts by mobiles in standards. In some cases, cell broadcast message have specific meanings, and will never be displayed. For the majority, since they just contain useful information (such as news, sports and weather), the display and management of messages is left to the imagination of mobile phone designers. It is likely that, given the similarity with point-to-point text messages, that those that are not filtered out will be entered into the queue of incoming short messages. This type of handling will not be satisfactory for emergency alerts.

Some of the specific requirements that can be derived for emergency alerts are:

- The method of identifying an emergency alert must be precisely defined. This probably means that one or more message types have to be reserved for this service, by industry agreement.
- They must be deleted **by the phone** when they have expired. There will have to be precisely defined rules for when an alert can be considered to be expired at which point it should be deleted or clearly marked as expired by the phone. These rules will vary with technology, but could include the phone recognizing that the sequence or version number associated with a broadcast alert has been changed, or when an alert with a particular message type is no longer being broadcast (which will require the broadcast cycle to be well defined).
- They must be deleted when the mobile moves to a cell that is completely outside the zone of the emergency. It would be simple, but unsatisfactory, to program a mobile to delete all emergency alerts whenever it recognizes that it is obtaining service from a different cell (under the assumption that the alert will be broadcast again if the new cell is still within the emergency area). This is because there may be a significant time lag between entering a cell and receiving the full emergency alert message. A mobile in a border area might never receive the full alert because of frequent serving system changes.
- They must be retained when 'deleted' by the user. In some systems the only way to recognize that a broadcast message is new is that it has an identity not currently held by the phone. If the user was to be able to delete the entire message it would reappear on the phone as a new message on the next broadcast cycle. Such retained alerts may not be displayed any more, but cannot be fully deleted until the phone has recognized that they have expired or the phone has moved to a different cell coverage area. Optionally, it may be a requirement that the alert continue to be displayed until it is no longer valid.
- They must be given display priority over other text messages. They must not simply be added to the end of the queue of received text messages.
- They must bypass any treatment in the phone that could result in the user not being notified. The audible alert must not be able to be silenced for these messages.

CDMA Cell Broadcast

CDMA cell broadcast was first defined by [IS-637] and is now defined in its replacement, [TIA-637]. The cell broadcast must fit within a single Data Burst, which is 255 bytes long. There is no facility for concatenating multiple messages. Accounting for overhead (the Data Burst Message header, the SMS Transport Layer message type and category, the SMS Teleservice Layer Message Identifier and the broadcast address), this can accommodate a maximum of about 256 7 bit characters (which covers upper and lower case letters, digits and basic punctuation characters). The precise limit may vary with the overhead of various protocol layers.

For comparison, two sample messages in [PPW, 2004] were 252 characters for a weather warning (just under the limit) and 284 characters for an AMBER alert (10% over the limit). The standard test message "This is a test

of the Emergency Broadcast System. The broadcasters in your area have developed this system to keep you informed in the event of an emergency. If this had been an actual emergency, you would have received official instructions and information." is 258 characters long, just over the limit, and therefore could not be displayed by CDMA phones.

With an average English word size of 4.75 letters [Sigurd] (plus one space character), the CDMA cell broadcast limit represents about 45 words. At a normal delivery rate of 150-175 words per minute [Utterback] this represents about 15-18 seconds of speech, much less than the two minute maximum length of the verbal message associated with a non-presidential radio or television emergency alert.

In discussions with technical industry experts, who all declined to be identified, as they were not authorized to speak on behalf of their company, it became clear that CDMA cell broadcast is not implemented in most phones nor in most CDMA network equipment sold in the US.

TDMA

TDMA (TIA-136) is an 'end of life' technology. Its major proponents, such as AT&T Wireless and Cingular, are well into the process of migrating to the GSM family of standards (GSM, GPRS, EDGE, UMTS). Consequently, it is unlikely that further major software and hardware developments for this technology will be undertaken, even when standards exist.

A cell broadcast standard for TDMA was published in late 1999 [BATS]. These broadcast messages can be sent as a number of segments, so larger messages can be broadcast when spread over a number of air interface messages

[BATS] does not define any categories of emergency information. Categories defined in [TDMA Codes] are for data to assist mobiles while roaming or positioning functions, and for general interest information, such as news, weather and sports. The use of this protocol for emergency alerts would require the standardization of at least one new category, with accompanying software in TDMA phones to give it the correct treatment (e.g. to ensure that this service could not be turned off, unlike the information services) as well as the introduction of new network equipment for the validation and distribution of alerts.

In discussions with industry experts (who declined to be identified) it was agreed that this cell broadcast standard came too late in the life of this technology to be widely implemented (AT&T Wireless, the first company to announce a transition from TDMA to GSM, did so in 2000).

GSM and UMTS

Cell broadcast was defined in the original GSM specifications as Technical Specification 03.41. It was designed for the repetitive transmission of information, such as news and weather updates. It was designed for a capacity of about one 88 character message (about 15 words) every 2 seconds [Mouly]. It was designed to have a low priority and low bandwidth utilization. Its transmission may be stopped in times of congestion on the control channels.

As with other technologies, cell broadcasts are not acknowledged and GSM cell broadcasts can only be received by idle mobiles (i.e. not active in a call or data service). [03.41] Monitoring the cell broadcast channel does reduce the standby time of the phone and may be turned off for this reasons. [C56]

The largest cell broadcast allowed (using the default character set) is transmitted as 15 groups 93 characters (88 octets) i.e. 1395 characters. This GSM service clearly can transmit messages that are long enough for emergency alert service, but it may take a considerable amount of time. This equates to ½ of 1% of the bandwidth of a full 200 kHz GSM channel.

Each group of 93 characters takes 1.883 seconds to transmit. Including one latency period (e.g. the cellsite may have to wait until the next broadcast interval before initiating a transmission) a minimum sized cell broadcast could take up to 4 seconds to broadcast, and a maximum sized message about 30 seconds.

The standard test message is 258 characters long: "This is a test of the Emergency Broadcast System. The broadcasters in your area have developed this system to keep you informed in the event of an emergency. If this had been an actual emergency, you would have received official instructions and information." It would take 12 radio interface messages to transmit it, and up to 7 seconds.

If there are other alerts being broadcast (such as Location Services information or regular news and weather updates) there is no guarantee that their transmission would be stopped in favor of emergency alerts as this behavior is not specified.

GSM terminals must have the ability to ignore cell broadcasts of a type that they are not interested in or the user would be swamped with information they are not interested in. With a large number of broadcast types to choose

from it would be easiest for the user to allow them to specify a list of the alerts to allow, rather than a (much longer) list of alerts to deny. This would result in the filtering out of emergency alerts unless that broadcast type was on the 'allow' list or unless specifications were changed to mandate that certain broadcast types must be allowed through.

3GPP has withdrawn its specification (TS 24 012) which was being designed for use either with GSM or UMTS (Wideband CDMA). The work was transferred to the GSM-only specification TS 44 012, apparently leaving UMTS without a cell broadcast capability.

[03.41] recognizes the necessity of an interface between an outside entity and the GSM network to initiate cell broadcasts. However, this interface is deliberately not specified in detail. Only message 'primitives' are defined. This defines the contents of the interface messages, and the type of operations supported, but not the detailed encoding or transport protocol. This leaves it up to equipment manufacturers to design their own protocols.

The GSM network model assumes a direct connection between a Cell Broadcast Center and the Base Station. This would not allow proper validation of emergency alerts, and assumes that the initiator of the cell broadcast has access to cellsite coverage area (which is unlikely), so the model would have to be modified to incorporate an intermediate network element to perform the validation and distribution function. See above for more details on this issue.

Discussions with technical experts on GSM indicated that most phones supporting this technology do support cell broadcast. One company that provides cell broadcast capabilities in all their phones (all GSM) is Siemens. One of their phone manuals [C56] illustrates a number of issues with cell broadcast for emergency alert service:

- The service reduces the battery life of the phone (even when there are no messages being broadcast, due to the need to continually scan the cell broadcast channel).
- The service may be deactivated by the user (e.g. to increase the standby time of the phone). This would result in no cell broadcasts of any type being displayed.
- The phone only displays cell broadcasts that are on the phone's 'Topic List' (i.e. it is an 'inclusion list'). If a standard value for an emergency alert was agreed to it would not likely be in the 'Topic List' of existing phones.
- The user must identify additional types of cell broadcast to display (beyond those pre-provisioned by their service provider) by number rather than by name. This is error prone, and there is probably no way to validate the number being entered (except that it must be no greater than the maximum message id number).

Interactions with Other Services

There are other services that are designed to be used in times of emergencies.

One of these is Wireless Priority Service (WPS), published in September 2004, which provides priority access to voice channels for authorized emergency workers [TIA-917]. This service also makes extensive use of control channels due to the more complex call setup (particularly if a mobile is queued for a length of time). Consequently, there will be some competition for resources between WPS and an emergency alert system based on cell broadcast.

Another important service in times of emergency is 9-1-1 [J-36]. The ability to make an emergency call is also dependent on access to control channels and on the battery life of the phone (which is reduced by monitoring the cell broadcast channel).

The interactions between WPS, wireless enhanced 9-1-1 and wireless emergency alert services may be minor. However, an evaluation is probably wise before widespread implementation of wireless EAS.

Conclusions

The wireless service that is most suitable for extending Emergency Alert Service to wireless phones is cell broadcast. In some ways this service is suitable for the application, in some ways it is unsuitable and in other ways it could be adapted to the requirements.

Advantage of Cell Broadcast

Cell broadcast is efficient because one text message can be sent to all idle mobiles in the cell sites within the zone of the emergency.

Disadvantages of Cell Broadcast

Cell broadcast may reduce the battery life of phones, meaning that there will be more times when a call cannot be placed during an emergency due to a dead battery Battery life is particularly important during weather or terrorist emergencies that may disrupt the mains power supply and prevent the recharging of many cellular phones

Cell broadcasts have relatively small maximum lengths. Even for GSM, which allows alerts up to 1395 characters, they would not accommodate the maximum two minutes allowed for non-presidential emergency alert announcements (about 300 words or 1725 characters). Consequently, alerts will have to be rewritten for the wireless technology that provides the shortest messages (currently CDMA, which has a 256 character limit, allowing about 45 words, or about 18 seconds of speech)

Cell broadcast is not provided by analog and does not appear to be implemented by TDMA systems (which are unlikely to be upgraded now). Consequently, mobiles operating in these modes are unlikely to be able to receive emergency alerts sent by cell broadcast

Cell broadcast can only be received while a mobile is idle (unless the network is specially programmed to recognize these special messages and repeat them on every active voice channel) and only when the mobile is powered on. This means that emergency alerts will still not be received when people have their phones turned off (e.g. when they are sleeping)

Current Deficiencies

Cell broadcast has a number of deficiencies currently that could be addressed. However, these would require that all existing mobiles be upgraded or replaced Consequently a solution based on modified cell broadcast would take several years before achieving wide coverage

The first step is the need to define standard identifiers for Emergency Alert Service cell broadcasts so that mobiles and network equipment can recognize these special messages. Mobile phone software will have to be modified so that emergency alerts are handled with the high priority that they need and deleted only when they become invalid. New network elements are required to perform the validation of incoming emergency alerts and perform the mapping from SAME geographical areas to cellsite coverage areas, based on a continually updated list of cell coverage areas. A standard interface to these new network elements must be defined

Cell broadcast does not appear to be implemented for CDMA or standardized for UMTS. Since both of these are technologies that are actively being developed it is possible that this will change over time.

Glossary

Term	Definition
3GPP	Third Generation Partnership Project
AMPS	Advanced Mobile Phone Service
BSC	Base Station Controller
CBC	Cell Broadcast Center
CDMA	Code Division Multiple Access
EAS	Emergency Alert System
EIA	Electronics Industry Association
ETSI	European Telecommunications Standards Institute
GSM	Global System for Mobility
IDEN®	Integrated Digital Enhanced Network
MSC	Mobile Switching Center
N-AMPS	Narrowband AMPS
PCS	Personal Communications Systems.
SAME	Specific Area Message Encoding.
SIM	Subscriber Identification Module ('Smart Card')
TDMA	Time Division Multiple Access. Often refers to IS-54/TIA-136 even though GSM is also a TDMA system.
TIA	Telecommunications Industry Association
UIM	3G User Identification Module
UMTS	Universal Mobile Telecommunications System